DIO7718
300mA Low Iq , Wide Input Voltage Low Dropout Regulator

Features

- Operating Input Voltage Range: 2.5V to 30V
- Fixed Voltage Out: 1.8V(upon request)
- Ultra−Low Quiescent Current: typ. 4μA over Temperature
- PSRR: 60dB at 1kHz
- Stable with Small 1μF Ceramic Capacitor
- Soft−start to Reduce Inrush Current and Overshoots
- Thermal Shutdown and Current Limit Protection
- SOA Limiting for High Vin/High Iout – Static/ Dynamic
- Active Discharge Option Available (upon request)
- Available in TSOT23−5 and SOT23−5 Packages
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Descriptions

The DIO7718 is 300mA LDO Linear Voltage Regulator. It is a very stable and accurate device with ultra−low quiescent current consumption (typ. 4μA over the full temperature range) and a wide input voltage range (up to 30V). The regulator incorporates several protection features such as Thermal Shutdown and Current Limiting.

Applications

- Wireless Chargers
- Portable Equipment
- Communication Systems

Typical Applications

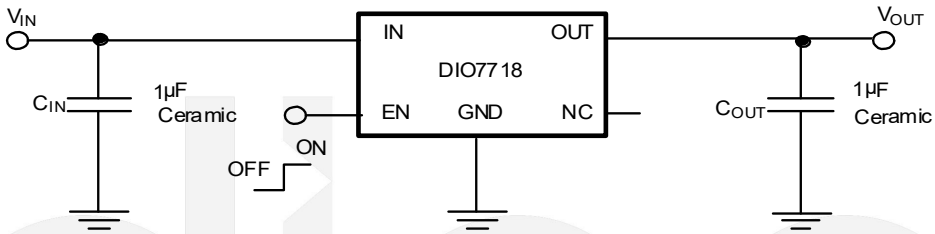


Figure 1. Typical Application Schematic

Ordering Information

Order Part Number	Voltage Option	Top Marking		T_A	Package	
DIO7718A180TST5	1.8V	YWAD	Green	-40 to 85°C	TSOT23-5	Tape & Reel,3000
DIO7718A180ST5	1.8V	YWAD	Green	-40 to 85°C	SOT23-5	Tape & Reel,3000

Pin Assignment

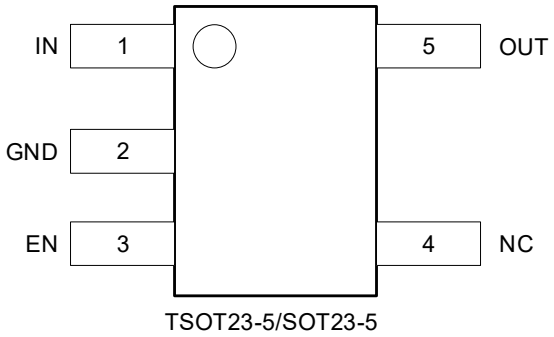


Figure 2. Top View

Pin Descriptions

Name	Description
IN	Input pin. A small capacitor is needed from this pin to ground to assure stability.
GND	Power supply ground.
EN	Enable pin. Driving this pin high turns on the regulator. Driving EN pin low puts the regulator into shutdown mode.
NC	Fixed Version: No connection. This pin can be tied to ground to improve thermal dissipation or left disconnected.
OUT	Regulated output voltage pin. A small 1μF ceramic capacitor is needed from this pin to ground to assure stability.

Absolute Maximum Ratings

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage (Note 1)	−0.3 to 30	V
V_{EN}	Enable Voltage	−0.3 to V_{IN}+0.3	V
V_{OUT}	Output Voltage	−0.3 to V_{IN}+0.3 (max. 6)	V
$T_{J(MAX)}$	Maximum Junction Temperature	150	℃
T_{STG}	Storage Temperature	−55 to 150	℃

Electrical Characteristics

-40°C ≤ T_J ≤ 125°C; V_{IN} = 2.8V, whatever is greater; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1μF, unless otherwise noted.

Typical values are at T_J = 25°C. (Note 2)

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_{IN}	Operating Input Voltage			2.5		30	V
V_{OUT}	Output Voltage Accuracy (fixed versions)	−40°C ≤ T_J ≤ 125°C, V_{OUT} + 1V < V_{IN} < 30V, 0.1mA < I_{OUT} < 300mA (Note 4)	V_{OUT} = 1.8V	−2%		2%	V
V_{OUT}	Reference Voltage Accuracy	−40°C ≤ T_J ≤ 125°C, 2.8V < V_{IN} < 30V		−2%		2%	V
Reg_{LINE}	Line Regulation	2.8V ≤ V_{IN} ≤ 30V, I_{OUT}=1mA			10		mV
Reg_{LOAD}	Load Regulation	I_{OUT} = 0.1mA to 300mA			10		mV
V_{DO}	Dropout voltage	V_{DO}= V_{IN}–($V_{OUT(NOM)}$– 3%), I_{OUT} = 300mA	1.8V		500		mV
I_{LIM}	Maximum Output Current	V_{IN} = 2.8V(Note 3)		300		800	mA
I_{DIS}	Disable Current	V_{EN} = 0V			0.3	1.0	uA
I_Q	Quiescent Current	I_{OUT} = 0mA			4.0	8.0	uA
I_{GND}	Ground current	I_{OUT} = 10mA			50		uA
		I_{OUT} = 300mA			300		
PSRR	Power Supply Rejection Ratio	V_{IN} = 2.8V, V_{OUT} =1.8V, I_{OUT} = 1mA, C_{OUT} = 1μF	f = 1kHz		60		dB
V_N	Output Noise Voltage	V_{OUT} = 1.8V, I_{OUT} = 10mA, f = 100Hz to 100kHz			36		uVrms
V_{EN_HI}	Enable Input Threshold Voltage	Voltage increasing		1.2			V
V_{EN_LO}		Voltage decreasing				0.4	
I_{EN}	EN Pin Current	V_{EN} = 5.5V			100		nA
Rdis	Active Output Discharge Resistance	V_{IN} = 5.5V, V_{EN} = 0V			100		Ω
T_{SD}	Thermal Shutdown Temperature (Note 4)	Temperature increasing from T_J = 25°C			150		℃

T_{SDH}	Thermal Shutdown Hysteresis(Note 4)	Temperature falling from T_{SD}		25		℃

Specifications subject to change without notice.

Note:

1. Refer to ELECTRICAL CHARACTERISTICS and APPLICATION INFORMATION for Safe Operating Area.
2. Performance guaranteed over the indicated operating temperature range by design and/or characterization production tested at $T_J = T_A = 25°C$. Low duty cycle pulse techniques are used during testing to maintain the junction temperature as close to ambient as possible.
3. Respect SOA
4. Guaranteed by design and characterization.

Typical Performance Characteristic

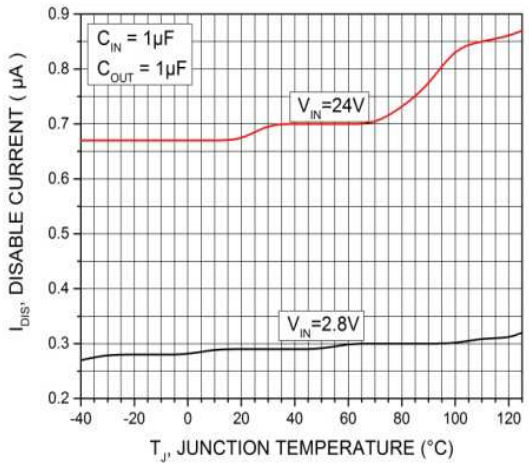


Figure 3. Disable Current vs Temperature
V_{OUT}=1.8V

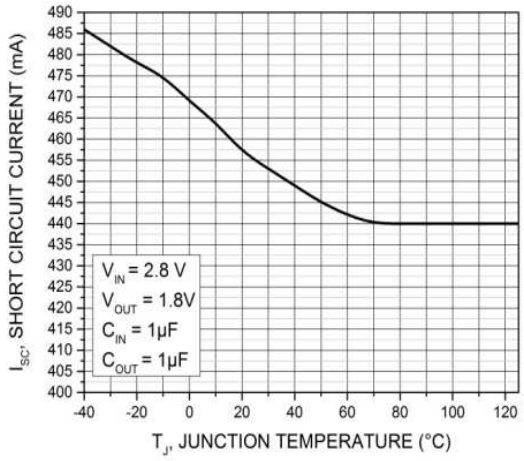


Figure 4. Short Circuit Current vs Temperature
V_{OUT}=1.8V

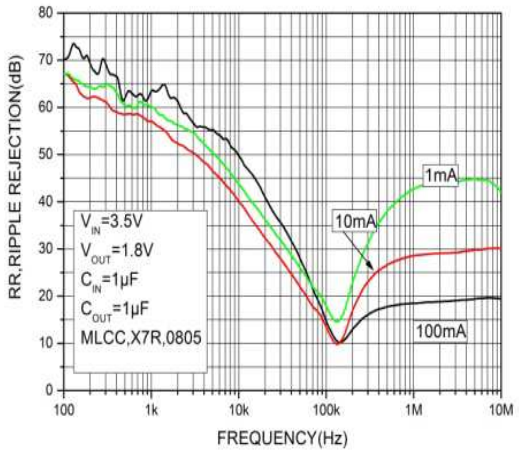


Figure 5. Power Supply Rejection Ratio vs Current
V_{IN}=3.5V, C_{OUT}=1µF

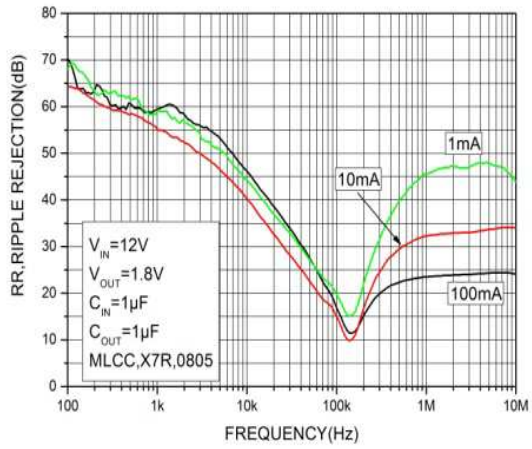


Figure 6. Power Supply Rejection Ratio vs Current
V_{IN}=12V, C_{OUT}=1µF

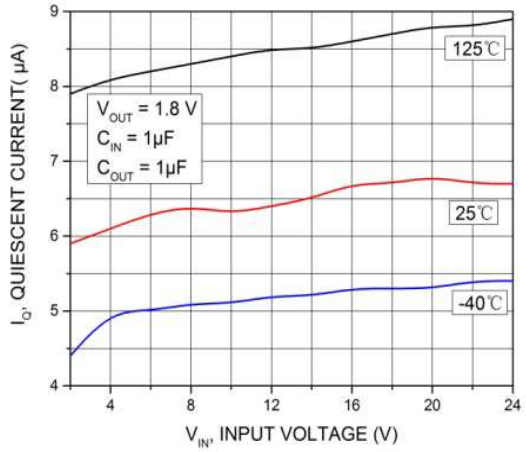


Figure 7. Quiescent Current vs Input Voltage
V_{OUT}=1.8V

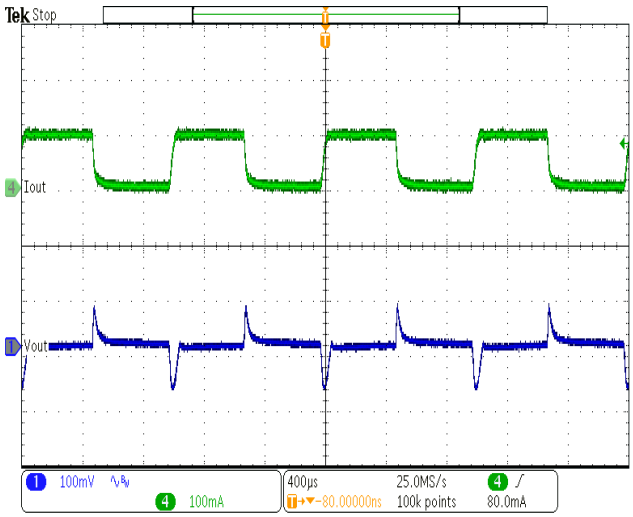


Figure 8. Load transient response
V_{IN}=2.8V V_{OUT}=1.8V I_{LOAD}=5mA~100mA

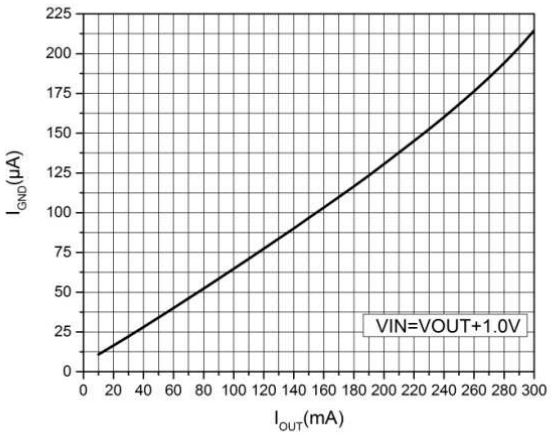
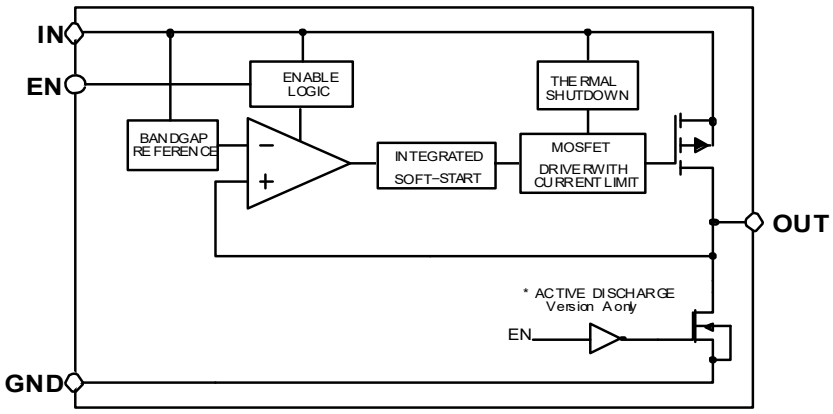


Figure 9. I_{GND} vs I_{OUT}

Functional Block Diagraph



Fixed Version

Figure 10. Functional Block Diagraph

Application Information

The DIO7718 is the member of new family of Wide Input Voltage Range Low Dropout Regulators which delivers Ultra Low Ground Current consumption, Good Noise and Power Supply Rejection Ratio Performance. The DIO7718 incorporates EN pin and soft−start feature for simple controlling by microprocessor or logic.

Input Decoupling (C_{IN})

It is recommended to connect at least 1μF ceramic X5R or X7R capacitor between IN and GND pin of the device. This capacitor will provide a low impedance path for any unwanted AC signals or noise superimposed onto constant input voltage. The good input capacitor will limit the influence of input trace inductances and source resistance during sudden load current changes.

Higher capacitance and lower ESR capacitors will improve the overall line transient response.

Output Decoupling (C_{OUT})

The DIO7718 does not require a minimum Equivalent Series Resistance (ESR) for the output capacitor. The device is designed to be stable with standard ceramics capacitors with values of 1μF or greater. The X5R and X7R types have the lowest capacitance variations over temperature thus they are recommended.

Power Dissipation and Heat Sinking

The maximum power dissipation supported by the device is dependent upon board design and layout. Mounting pad configuration on the PCB, the board material, and the ambient temperature affect the rate of junction temperature rise for the part. For reliable operation junction temperature should be limited to 150°C.

The maximum power dissipation the DIO7718 can handle is given by:

$$P_{D(MAX)} = \frac{[T_{J(MAX)} - T_A]}{R_{\theta JA}} \qquad \text{(eq.1)}$$

The power dissipated by the DIO7718 for given application conditions can be calculated from the following equations:

$$P_D \approx V_{IN} \left(I_{GND} \left(I_{OUT} \right) \right) + I_{OUT}(V_{IN} - V_{OUT}) \qquad \text{(eq.2)}$$

or

$$V_{IN(MAX)} \approx \frac{P_{D(MAX)} + (V_{OUT} \times I_{OUT})}{I_{OUT} + I_{GND}} \qquad \text{(eq.3)}$$

Hints

V_{IN} and GND printed circuit board traces should be as wide as possible. When the impedance of these traces is high, there is a chance to pick up noise or cause the regulator to malfunction. Place external components, especially the output capacitor, as close as possible to the DIO7718, and make traces as short as possible.

CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as, cell phone, handheld products, laptop, and medical equipment and so on. Dioo's product families include analog signal processing and amplifying, LED drivers and charger IC. Go to http://www.dioo.com for a complete list of Dioo product families.

For additional product information, or full datasheet, please contact with our Sales Department or Representatives.